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-1. (Once Amended) A method for modifying the rheology of a slurry of a mineral-containing solid material and water, wherein the mineral-containing solid material is nickel ore, cobalt ore, precious metals ore, copper ore, taconite, mineral sands, coal, bauxite or a mixture thereof, the method comprising adding to the slurry a [low molecular weight] sulfonate-containing polymer having an average molecular weight ranging from about 2,000 to 100,000.

✓
Please cancel claim 3.--

REMARKS

The aforementioned amendments have been made in order to place the application in condition for allowance. It is submitted that no new matter has been added by way of these amendments.

The Examiner has raised a series of objections stating that the claimed invention is both anticipated and obvious in view of a small number of references.

The presently claimed inventive method as disclosed relates to mining and mining processing applications wherein the rheological properties of slurries are modified in order to achieve reduced viscosity and improved slurry consistency. The method as claimed utilizes a sulfonate-containing polymer (rheology modifier) having an average molecular weight ranging from 2,000 to 20,000. Surprisingly the rheology modifier provides beneficial results in mining applications as acceptable viscosity reduction is achieved at lower dosages than conventionally available modifiers. The modifier can be added to the water of the slurry before or after establishment of the slurry.

Halverson, U.S. Patent No. 4,342,653 and Richardson et al, U.S. Patent No. 4,704,209 are cited as anticipating or alternatively making obvious the claimed method of the subject application.

Halverson discloses a flocculant containing 2 acrylamido -2-methyl propanesulfonic acid. In addition to the flocculating ability, the reference emphasizes achieving a higher degree of compaction of the flocculated solids.

Horsley et al discloses and claims a method for selectively determining the flow of siliceous materials containing impurity/impurities wherein a pre-determined amount of a dispersant is employed to provide an economically viable product for pumping. The amount of dispersant is disclosed as being proportional to the amount of impurity in the slurry. Dispersants are disclosed as being selected from sodium phosphate (see column 2, lines 35-40) and are claimed as being selected from inorganic sodium phosphates and naphthalene sulphonate aminoplast polymers.

Claims 2-4, 6 and 7 are further rejected as being unpatentable over Horsley et al in combination with Brown et al U.S. Patent No. 5,317,053 citing 35 U.S.C. 103(a). It is asserted in this objection that the sulfonate-containing polymers of the instantly claimed invention are disclosed wherein it would be obvious to combine this teaching with that of Horsley to apply the dispersants of Brown in the systems of Horsley.

Brown et al is concerned with the production of a high solids aqueous slurry of particulate calcium carbonate having stable aging characteristics wherein a dispersant (dispersing agent) comprised of a copolymer of acrylic acid and a sulfonated vinyl monomer is added to a slurry with 20 to 34 lbs/ton of dry mineral of a copolymer of acrylic acid and a sulfonated vinyl

monomer being added for treatment. The carboxylic acid sites are neutralized with polyvalent cation and the balance of the carboxylic sites being neutralized with a monovalent cation.

This reference is primarily concerned with the treatment of aqueous slurries in paper coating and other applications. High concentrations (20-34 lbs/ton) of the acrylic acid sulfonated vinyl monomer are added for long term stability.

The claimed method as amended recites a method for modifying the rheology of slurry of a mineral containing solid. Inherent within such an environment are highly oxidized deposits which are being treated with a dispersant disclosed as a sulfonate containing polymer with a specific weight range of from 2,000 to 100,000.

Halverson discloses and claims a method of flocculating suspended solids utilizing acrylamide, 2-acrylamido-2-methylpropane sulfonic acid and optionally acrylic acid wherein the flocculant has a Brookfield viscosity of at least 2.0 cps.

Horsley as discussed above discloses and claims a method for facilitating the flow of material in the form of fines selected from silica based materials whereby the dispersant level is proportional to the level of impurities. The dispersants are selected from sodium phosphates and naphthalene sulphonate aminoplast polymers.

Richardson is concerned with flocculating suspended solids utilizing copolymers of acrylamide and 2-acrylamido-2-methylpropanesulfonic acid.

Brown et al disclose and claim a copolymer of acrylic acid and a sulfamated vinyl monomer for use as a dispersant in primarily papermaking operations.

Not one reference taken either alone or in combination discloses or claims the use of a sulfonate containing polymer for rheology modification of mineral containing solids wherein the

sulfonate containing polymer is of the (average) molecular weight as disclosed in the instant application. It should be apparent to one of ordinary skill in the art that the sulfonate containing polymers are dispersants and not flocculants as many of the references disclose. The (average) molecular weight as now recited in claim 1 is clearly indicative that the compounds act as dispersants. There is appropriate support for the weight range recited in claim 1 being 1 from 2,000 to 100,000 as this range is a subset of the broadest disclosure containing on page 6 of the specification. The person of ordinary skill in the art would recognize that as the molecular weight increases to the top of the disclosed range and beyond, the dispersant could have the propensity to become a flocculant and therefore would not be practical for use in the claimed method.

It should be further noted that the disclosure in the Tables (I and II) show dispersant efficacy at low concentrations g/ton rather than the "lbs/ton" disclosure of Brown et al.

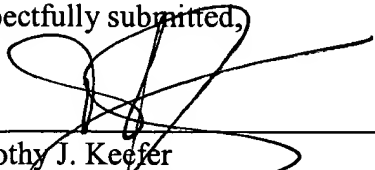
Attached please find an Associate Power of Attorney authorizing the undersigned to act on behalf of the Applicant for this reply only. All future correspondence should be mailed to the Applicant/Assignee corporate address.

In view of the aforesaid it is respectfully submitted that no reference taken alone serves to destroy the novelty of the inventive method as claimed nor is there any foreseeable permissible means to combine any references such that one could arrive at the method as now claimed.

Accordingly, favorable reconsideration is requested.

An associate Power of Attorney is attached herewith providing authorization for the undersigned to act on the Applicant's behalf.

Respectfully submitted,



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